# Plant Guide

## *Spartina alterniflora*

## Smooth Cordgrass

USDA NRCS
Natural Resources Conservation Service

LSU AgCenter
Research & Extension

# Plant Guide: *Spartina alterniflora* Smooth Cordgrass

## Nomenclature

**Scientific Name** - *Spartina alterniflora* Lois.

**Common Name** - Smooth cordgrass is the most widely accepted common name; however, literature and informal references also cite saltmarsh cordgrass, oystergrass, and saltwater cordgrass as other common names.

**Cultivars** - There are two known cultivars, Vermilion and Bayshore. Vermilion was released in 1989 for use in the Gulf of Mexico northern basin, and Bayshore was released in 1992 for use on the Atlantic Coast. Both were released by the Natural Resources Conservation Service through its Plant Materials Program.

**Similar Species** - None

## Description

Smooth cordgrass is a herbaceous, native, warm season grass that forms dense vegetative colonies along shorelines and inter-tidal flats in coastal wetlands. Smooth cordgrass is a robust, rapidly spreading plant, tolerant of fluctuating water depth and salinity. Smooth cordgrass spreads primarily by vegetative propagation, producing new stems from an extensive system of underground rhizomes. Plant height will vary according to site conditions, but generally will range from 24" to 72". Colonies tend to grow parallel to and continuous along shorelines; the width and thickness of a vegetative colony are controlled by a number of site-specific conditions such as elevation, shoreline-slope, and frequency, depth, and duration of flooding.

Smooth cordgrass is a unique plant species that, when established properly and under applicable conditions, has provided significant erosion protection to shorelines, canal banks and other areas of coastal wetland loss.

Smooth Cordgrass
Growth Form & Habitat

## Use

Smooth cordgrass is used primarily for erosion control along shorelines, canal banks, levees, and other areas of soil-water interface. In addition, smooth cordgrass is an effective soil stabilizer used on interior tidal mudflats, dredge-fill sites, and other areas of loose and unconsolidated soils associated with marsh restoration. When established in conjunction with shorelines, smooth cordgrass provides an effective buffer that dissipates energy, reduces shoreline scouring, and traps suspended sediments and other solids. Dense stands of smooth cordgrass are efficient users of available nutrients, producing significant amounts of organic matter. The cumulative effects of organic matter production, sediment trapping, and erosion control not only provide shoreline protection but also accelerate sediment accumulation and near-shore building. Consequently, smooth cordgrass is a sustainable and renewable restoration resource, and when properly established and in the appropriate habitat, will persist and potentially remain effective indefinitely.

## Habitat

Smooth cordgrass is an inter-tidal brackish plant species. It is described as a facultative halophyte; that is, it will tolerate salt, but salt is not a requirement for its growth. Smooth cordgrass can be established in fresh water, however, numerous field trials have demonstrated that smooth cordgrass is difficult to establish and will not persist under freshwater field conditions. The ideal salinity range for establishing and growing smooth cordgrass is 8 to 33 parts per thousand or brackish to saline habitats. Smooth cordgrass can be established and will persist in areas of elevated salinity (such as salt-flats and tidal

lagoons), however, plants in high saline habitats tend to be stubby and less robust, generally resulting in thinner and more open vegetative stands.

Smooth cordgrass will tolerate fluctuating water levels. Optimum water depths for establishing plants are 1" to 18". Plantings in deeper water have been successful, but plants are slow to anchor and vegetative cover is sparse. Consequently, plants are more prone to washout, and minimal shoreline protection is achieved. Of primary importance in site selection is that the site be inter-tidal. Smooth cordgrass is critically sensitive to reduced soil sulfides, a condition common to anaerobic and brackish marsh soils. Smooth cordgrass should not be planted outside of the tidal zone.

Smooth cordgrass is adapted to a wide range of soils from coarse sands to clays and mucks. Plant establishment and productivity appear to be superior on heavier mineral soils such as mucky clays, silty clays, silty clay loams, and fine sands. Soils with very high levels of organic matter pose structural problems and have been problematic in establishing stands of smooth cordgrass.

## Plant Form

Smooth cordgrass is a poor seed producer. Although plants appear to produce a significant number of seeds, most seeds are empty, damaged, or sterile. Consequently, seed fertility is low. For planting purposes, two forms of vegetative plant materials are recommended, containerized and bare-root plugs. Both plant forms have been equally successful in establishing plant stands when planted properly and on applicable sites. There are no commercially available sources of seed, and seeding is not a recommended practice.

Smooth cordgrass can be produced in a number of container sizes, but trade-gallons are the most widely used and most popular size. Trade-gallon containers have a higher per unit cost compared to smaller containers or bare-root plugs, but provide the most reliable means of establishment. Trade-gallon plants have been a highly successful transplant, especially along shorelines and other areas of high wave energy.
A trade-gallon will have 5 to 12 aerial stems that are 18" to 24" in height. Smooth cordgrass produces new tillers (stems) and spreads almost entirely from rhizomes, an underground modified stem. Consequently, a well-developed rootmass is critical to the survival and productivity of transplants.


Bare-root plugs are the most economical of the commercially available plant sizes. Per unit production costs are low and transportation costs are very low compared to container plants. Bare-root plugs are generally limited to planting sites that have little or no energy exposure. Typical sites would include mudflats, sediment disposal areas, terraces, or other interior and protected sites. Bare-root plugs, because of their limited surface area, will not persist in high energy environments. They tend to dislodge prior to establishing. Bare-root plugs have significantly less rootmass than container plants, will suffer a higher level of transplant shock, and are slower to spread than container plants. However, if handled properly and used on an applicable site, bare-root plugs can be highly successful transplants.


Bare-root plugs typically consist of 3 stems 12" to 18" in height, and stems should remain attached at the root. Plugs should have a rootmass of at least 2" in diameter at the root crown and 6" of root length.

A complete description (specification) for both trade-gallon container plants and bare-root plugs is available from the Natural Resources Conservation Service.

# Planting Guidelines

**Planting Date** - As a general rule, smooth cordgrass can be planted between April 1 to September 30. Some additional considerations include the following:

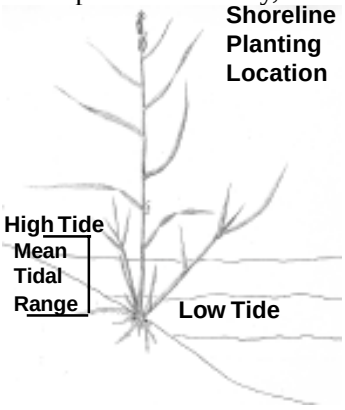
Smooth cordgrass can be planted anytime past the last frost date if there is a need to plant earlier and available transplants are actively growing. In some areas this may be earlier than April 1.

In interior marshes with poor water circulation, avoid planting between mid-July and the end of August. Elevated water temperatures are generally detrimental to new transplants; therefore July and August plantings should be limited to lakes, bayous, and other areas of frequent tidal exchange.

Late fall plantings in October and November have been successfully made in the past, but should be limited to sites that are well-protected and have minimal winter storm effect.

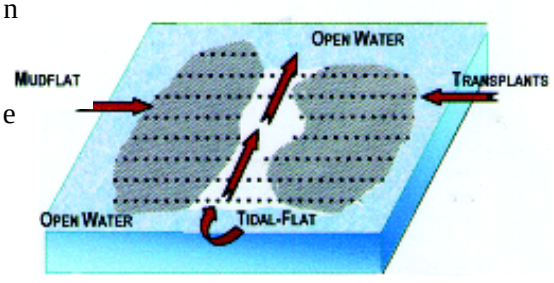
**Planting Location** - It is critically important to remember that smooth cordgrass is strictly an inter-tidal plant species and must be planted within the inter-tidal zone. Smooth cordgrass can be used for erosion control along shorelines, canal banks, levees, and other areas of soil-water interface. In addition, smooth cordgrass is an effective soil stabilizer used on interior tidal mudflats, dredge-fill sites, and other areas of loose and unconsolidated soils associated with marsh restoration.

**Shoreline Plantings** - Shoreline plantings are typically planted as a single row parallel to the shoreline. Transplants should be planted at the mid-point between the high and low tide elevations. Plant spacing within the row will vary according to the size of the transplant materials being used and the rate at which full coverage is desired. Trade-gallons generally are planted on 5' to 8' centers and plugs generally on 2' to 3' centers. Under applicable site conditions, smooth cordgrass will spread laterally, filling spaces between plants, and will grow up to its highest elevation and down to its lowest elevation. It is not uncommon for smooth cordgrass to produce 8' to 10' of lateral spread in one growing season.




Depending on site conditions and the planting objective, two rows of smooth cordgrass are occasionally planted. A two-row planting will provide quicker and denser short-term coverage than a single-row planting. If two rows are planted, rows should be parallel to each other and about 5' apart using the same plant spacing within row as that of a single row. The first row should be placed slightly above the mean tide elevation and the second row 5' below the first. Plants within the two rows should be staggered on center so that plants alternate between spaces.

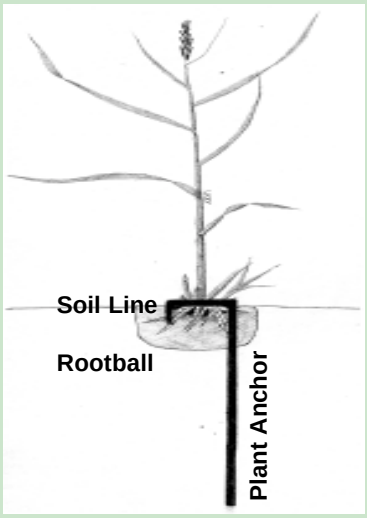
**Interior Plantings** - In addition to planting shorelines, smooth cordgrass can also be used along terraces, levees, across mudflats and dredge-fill sites. The planting configuration should be designed to provide maximum reduction in fetch lengths. Rows can be placed across shallow water exchange points to create a passive hydrologic barrier that will slow tidal exchange and trap suspended sediments. Planting large areas generally will require a significantly large number of plants. Where applicable, plugs can be used and placed in a row-column configuration. The row and plant spacing can vary from a few feet to many, depending on the objective of the planting, the target rate for coverage, and available resources.




**Example of an interior marsh planting: Row/ Column configuration on elevated mudflats with plants across tidal openings**

**Planting Methods** - When planting trade-gallons, place transplants in a dug hole. Post-hole diggers, gas drills with modified bits, or any other methods of digging are satisfactory. The planting hole should be the same size or only slightly larger than the rootball and deep enough so that the top of the rootball is flush or slightly below ground. The top of the rootball should not protrude above nor be more than 2" below normal ground. The planting hole should be tightly closed around the plant to prevent the plant from wobbling, and plants should remain erect after planting.

Planting sites where high wave energy is a problem may require the addition of a plant anchor. A plant anchor consists of 1/4" mild steel re-bar bent into a crosier hook (candy-cane shape) and pushed down into the soil so that the hook lies across the rootball pinning it to the ground. Anchors are generally about 30" in overall length and will add to the cost of the planting. However, anchors are generally necessary at unusually problematic sites to prevent plants from washing out.




When planting bare-root plugs, holes need only be approximately 3" in diameter and deep enough to cover the roots. Any style of tool that will punch a hole this size such as a dibble bar will work. Cupping the roots of the plug in hand and pushing down into the mud carefully will also work in more fluid soils. There are no plant anchors for plugs, and in practice plugs should not be used at any site where wave energy is a factor.

**Fertilization** - There is no clear consensus on the effectiveness of fertilizer when used in saturated and/or anaerobic soils. However, the additional cost of fertilizer is a small investment given the overall cost involved in vegetative restoration. High nitrogen slow-release fertilizer tablets will add approximately .08 to .10 cents to the cost of an individual plant.

Slow-release fertilizer tablets are commercially available in a range of weights and analyses. Recommended tablet weight should be between 15 and 25 grams and have a nitrogen content of not less than 15% or more than 30%. When using tablets with trade-gallon plants, push the tablet into the top 3" of the rootball immediately before or immediately after planting the transplant. The resulting hole should be pinched closed. When using tablets with bare-root plugs, drop the tablet in the planting hole before inserting the plug.

## Plant Materials Source

Plant materials are generally obtained from two sources, a donor wetland site or commercial nurseries. The use of donor wetlands to obtain young plants will eventually affect the health and vigor of the donor stand, regardless of the care taken in frequency, spacing, and location of plant removal. In addition, the removal of plant materials without the applicable permits may be in violation of standing state and federal regulations. Removing plant materials from donor stands is not recommended.

Nursery-grown stock is generally the most reliable and ecologically appropriate way to obtain plant materials. A number of commercial nurseries produce and maintain smooth cordgrass transplants. Trade-gallon and vegetative plugs are the two most common sizes, but most nurseries will contract for other container sizes. Smooth cordgrass seed is not commercially available.

Vegetative specifications should be used to tailor plant material quality and quantity to a specific project. These specifications should include acceptable sources, cultivars, ecotypes, plant size, stem height, container specifications, and extent of root development. In addition, other requirements such as climatic hardening, salt hardening, procedures for transportation and handling are commonly included.

A list of commercial wetland plant nurseries and assistance in developing plant material specifications is available from the Natural Resources Conservation Service and the LSU AgCenter Extension Service.

## Other Considerations

There are a number of other site-specific elements that should be considered when working with smooth cordgrass. These conditions represent extremes and should be thoroughly investigated before committing to a significant project if any of these conditions occur.

**Soil load-bearing properties** - It is not uncommon for soils (especially in dredge deposit sites) to be fluid to the point that they physically will not support the weight of plants. This is an indicator of soils with a very high water-to-mineral ratio.

**High organic soils** - Smooth cordgrass will not survive in soils with extremely high levels of organic matter. These soils are described as having very low bulk density and are problematic. When soil texture approaches the consistency of peatmoss, there is potential for low plant survival.

**Poor water circulation** - Smooth cordgrass is critically sensitive to sulfide accumulations and has a relatively low tolerance to sulfide toxicity.

**Shoreline configuration** - Abrupt and steep cut-banks are indications of high wave energy and/or highly erodible soils. Special precautions may be required to keep transplants from dislodging before becoming established.

**Herbivore grazing** - Smooth cordgrass is a favorite of numerous grazing animals. In areas of heavy nutria population, caging plants may be required to protect newly planted material.

**Smothering** - Precautions should be taken when planting in areas of heavy floating debris. Both mechanical damage to the plants from surf trash and smothering from water hyacinths are common.

If any of these conditions are present, consult with a wetland specialist for additional information and/or possible alternatives.

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